CLAIMS:

1. A chemical vapor deposition (CVD) apparatus usable in the manufacture of superconducting conductor on an elongate substrate, the CVD apparatus comprising:

a) a reactor;

b) at least one substrate heater; and

c) at least one precursor injector having a longitudinal flow distributor.

2. The CVD apparatus according to Claim 1, wherein the at least one substrate heater further includes at least one susceptor.

3. The CVD apparatus according to Claim 2, wherein the susceptor has a radius of curvature for accommodating the elongate substrate.

4. The CVD apparatus according to Claim 1, wherein the substrate heater is a multiple-zone heater.

5. The CVD apparatus according to Claim 4, further including a surface heater.

6. The CVD apparatus according to Claim 5, wherein the surface heater is positioned so as to maintain a temperature at the growth surface on the substrate at a deposition temperature.

7. The CVD apparatus according to Claim 1, wherein the substrate heater is a single-zone heater.

8. The CVD apparatus according to Claim 7, further including a surface heater.

9. The CVD apparatus according to Claim 8, wherein the surface heater is positioned so as to maintain a temperature at a growth surface on the substrate at a deposition temperature.

10. The CVD apparatus according to Claim 8, wherein the surface heater is a lamp.

11. The CVD apparatus according to Claim 1, wherein the substrate heater comprises at least one heat source.

12. The CVD apparatus according to Claim 11, wherein the heat source comprises a plurality of lamps.

13. The CVD apparatus according to Claim 11, wherein the heat source is at least one resistance heating element.

14. The CVD apparatus according to Claim 1, further including a shield for protecting a low-temperature region of the substrate.

15. The CVD apparatus according to Claim 14, wherein the substrate shield is positioned so that the surface temperature over the deposit coating does not exceed the deposition temperature.

16. The CVD apparatus according to Claim 1, further including a precursor supply system.

17. The CVD apparatus according to Claim 16, further including a precursor source.

18. The CVD apparatus according to Claim 17, wherein the precursor source is a solid.

19. The CVD apparatus according to Claim 18, wherein the solid precursor source is a powder.

20. The CVD apparatus according to Claim 17, wherein the precursor source is a liquid.

21. The CVD apparatus according to Claim 20, wherein the liquid is a solution of THS and thd.

22. The CVD apparatus according to Claim 16, further including a delivery mechanism.

23. The CVD apparatus according to Claim 22, wherein the delivery mechanism comprises a pump when the precursor source comprises a liquid.

24. The CVD apparatus according to Claim 22, wherein the delivery mechanism comprises one of a mill and a conveyor when the precursor source comprises a solid.

25. The precursor delivery system according to Claim 16, further including a vaporizer.

26. The CVD apparatus according to Claim 25, further including a carrier fluid supply.

27. The CVD apparatus according to Claim 1, further including an exhaust system.

28. The CVD apparatus according to Claim 27, wherein the exhaust system is for removing reaction products from the elongate substrate surface.

29. The CVD apparatus according to Claim 28, wherein the exhaust system is a vacuum system.

30. The CVD apparatus according to Claim 1, further including a gas supply.

31. The CVD apparatus according to Claim 30, further including a mass flow control mechanism.

32. The CVD apparatus according to Claim 30, further including a carrier fluid supplied to the precursor supply system.

33. The CVD apparatus according to Claim 32, wherein the carrier fluid is an inert gas.

34. The CVD apparatus according to Claim 33, wherein the inner gas is argon.

35. The CVD apparatus according to Claim 30, wherein the gas is a reactive gas.

36. The CVD apparatus according to Claim 35, wherein the reactive gas is one of oxygen and nitrogen oxide.

37. The CVD apparatus according to Claim 1, further including a tape handler.

38. The CVD apparatus according to Claim 37, wherein the tape handler comprises a tape translation mechanism.

39. The CVD apparatus according to Claim 38, wherein the tape translation mechanism comprises at least one of a conveyor, reel-to-reel unit, robotic translator, and combinations thereof.

40. The CVD apparatus according to Claim 1, further including at least one controller in communication with at least the substrate heater.

41. The CVD apparatus according to Claim 40, further including at least one sensor in communication with the at least one controller.

42. The CVD apparatus according to Claim 41, wherein at least one sensor includes any one of a flow meter, a species monitor, a filament state monitor, a deposition sensor, a temperature sensor, a pressure sensor, a vacuum sensor, a speed monitor, and combinations thereof.

43. The CVD apparatus according to Claim 40, wherein the at least one controller is for regulating the at least one precursor injector.

44. The tape-manufacturing system according to Claim 40, wherein the at least one controller is for regulating the at least one precursor supply system.

45. The tape-manufacturing system according to Claim 40, wherein the at least one controller regulates a translational speed of the elongate substrate.

46. A precursor injector usable in a reactor of a chemical vapor deposition (CVD) apparatus in combination with a substrate heater and usable in the manufacture of superconducting conductor on an elongate substrate, the precursor injector comprising:

a) a longitudinal flow distributor; and

b) a transverse lateral flow restrictor.

47. The precursor injector according to Claim 46, wherein the longitudinal flow distributor includes an entrance, a receiver volume, a distributor, a distribution volume, and a plurality of exits.

48. The precursor injector according to Claim 47, wherein the entrance is a tube.

49. The precursor injector according to Claim 47, wherein the distributor is a perforated member.

50. The precursor injector according to Claim 49, wherein the perforated member has a density of between about 1 to 10 holes per inch.

51. The precursor injector according to Claim 47, wherein the distribution volume is less than the receiver volume.

52. The precursor injector according to Claim 47, wherein the receiver volume is greater than a total volume of perforations in the perforated member.

53. The precursor injector according to Claim 47, wherein a total volume of the perforations is greater than the distribution volume.

54. The precursor injector according to Claim 48, wherein there is an equal volume of perforations on both sides of the tube, and the tube is substantially in the center of the injector.

55. The precursor injector according to Claim 54, wherein the volume of perforations increases with an increasing direction from the tube.

56. The precursor injector according to Claim 55, wherein the volume of perforations is increased by increasing the diameter of the perforations.

57. The precursor injector according to Claim 55, wherein the volume of perforations is increased by increasing the thickness of the perforated member.

58. The precursor injector according to Claim 47, further including vapor delivery.

59. The precursor injector according to Claim 58, wherein a volume of the vapor delivery is greater than the receiver volume.

60. The precursor injector according to Claim 46, further including a temperature regulation system.

61. The precursor injector according to Claim 60, wherein the temperature regulator further includes a plurality of temperature sensors.

62. The precursor injector according to Claim 60, wherein the temperature regulation system includes a heat source.

63. The precursor injector according to Claim 60, wherein the temperature regulation system includes a cooler.

64. The precursor injector according to Claim 46, wherein the lateral flow restrictor is a physical extension of the precursor injector.

65. The precursor injector according to Claim 46, wherein the lateral flow restrictor is a gas curtain emanating from the injector.

66. The precursor injector according to Claim 46, wherein the lateral flow restrictor is spaced relative to the substrate heater in a manner to permit exhausting of reaction products from the surface of the elongate substrate.

67. A chemical vapor deposition (CVD) apparatus usable in the manufacture of superconducting conductor on an elongate substrate, the CVD apparatus comprising:

a) a reactor;

b) at least one substrate heater; and

c) at least one precursor injector having a longitudinal flow distributor and a transverse lateral flow restrictor; and

d) a shield for protecting a low-temperature region of the substrate.

68. The CVD apparatus according to Claim 67, wherein the substrate shield is positioned so that the surface temperature over deposit coating does not exceed the deposition temperature.

69. A method for manufacturing a high temperature superconducting conductor, said method comprising the steps of:

a) providing an elongate substrate to a reactor;

b) heating at least a portion of the substrate to a temperature sufficient to facilitate the formation of one of a predecessor to a superconducting material and a superconducting material; and

c) longitudinally distributing a flow of at least one precursor so as to communicate the at least one precursor with the heated at least a portion of the substrate so as to permit the formation of one of a predecessor to a superconducting material and a superconducting material.

70. A method for manufacturing a high temperature superconducting conductor, said method comprising the steps of:

a) providing an elongate substrate to a reactor;

b) heating at least a portion of the substrate to a temperature sufficient to facilitate the formation of one of a predecessor to a superconducting material and a superconducting material; and

c) longitudinally distributing a flow of at least one precursor; and

d) transversely restricting the flow of the at least one precursor so as to communicate the at least one precursor with the heated at least a portion of the substrate so as to permit the formation of one of a predecessor to a superconducting material and a superconducting material.

71. A method for manufacturing a high temperature superconducting conductor, said method comprising the steps of:

a) providing an elongate substrate to a reactor;

b) heating at least a portion of the substrate to a temperature sufficient to facilitate the formation of one of a predecessor to a superconducting material and a superconducting material;

c) longitudinally distributing a flow of at least one precursor;

d) transversely restricting the flow of the at least one precursor;

e) shielding a low-temperature region of the substrate so as to communicate the at least one precursor with the heated at least a portion of the substrate so as to permit the formation of one of a predecessor to a superconducting material and a superconducting material.

72. A high temperature superconducting conductor comprising:

a) an elongate substrate;

b) at least one oxide superconductor layer supported by said elongate substrate; and

c) an Ic of over about 190 A/cm-width.